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*Indian Standard*

DIMENSIONS AND TOLERANCES FOR  
HOT ROLLED TRACK SHOE SECTIONS

PART I SECTION TS-L1

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MANAK BHAVAN, 9, BAHADUR SHAH ZAFAR MARG  
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*Indian Standard***DIMENSIONS AND TOLERANCES FOR  
HOT ROLLED TRACK SHOE SECTIONS****PART I SECTION TS-L1**

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# *Indian Standard*

## DIMENSIONS AND TOLERANCES FOR HOT ROLLED TRACK SHOE SECTIONS

### PART I SECTION TS-L1

#### 0. FOREWORD

**0.1** This Indian Standard ( Part I ) was adopted by the Indian Standards Institution on 20 May 1982, after the draft finalized by the Structural Sections Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** The track shoe sections form an important component of the earth moving equipment and are subjected to heavy wear and tear during usage. There are several types of track shoe sections used in the manufacture of earth moving equipment. This standard covers one section and lays down the dimensions and tolerances applicable to the same. It is intended to cover other types in due course of time.

**0.3** In this standard the recommendations for material are given in Appendix A to give guidelines to the manufacturers of track shoe sections. It is not intended to be mandatory and is given as a source of information based on the present experience of manufacturers and users in the country to assist the development and use of these sections.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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#### 1. SCOPE

**1.1** This standard ( Part I ) covers dimensions, dimensional tolerances and weight of hot rolled track shoe section TS-L1.

**1.2** The rolling and cutting tolerances are also covered in this standard.

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\*Rules for rounding off numerical values ( revised ).

## **2. SYMBOLS**

**2.1** Letter symbols used in this standard ( See Fig. 1 and Table 1 ) are as follows:

<i>Lt</i>	—	Total length
<i>La</i>	—	Grouser axis length
<i>twt</i>	—	Thickness of grouser top
<i>twb</i>	—	Thickness of grouser bottom
<i>tp</i>	—	Plate thickness
<i>Hw</i>	—	Grouser height
<i>B</i> and <i>C</i>	—	Centre position for R1
<i>D</i> and <i>E</i>	—	Centre position for R2
<i>E</i> and <i>F</i>	—	Centre position for R3 and R4
<i>G</i>	—	Centre line basic distance
<i>R1</i>	—	Toe bottom radius
<i>R2</i>	—	Toe top radius
<i>R3</i>	—	Heel bottom radius
<i>R4</i>	—	Heel top radius
<i>R5</i>	—	Grouser radii
<i>R6</i>	—	Grouser to toe fillet radius
<i>R7</i>	—	Grouser to plate fillet radius
<i>R8</i>	—	Plate to heel matching radius
<i>R9</i>	—	Heel radii
<i>R10</i>	—	Toe radii

## **3. DESIGNATION**

**3.1** The shoe section shall be designated as TS-L1

## **4. DIMENSIONS AND TOLERANCES**

**4.1** Dimensions and dimensional tolerances shall be as given in Table 1. The unspecified tolerance on dimensions in Table 1 shall be  $\pm 0.8$  mm.

## **5. MASS**

**5.1** The mass shall be kg/m\* length of section.

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\*Based on density of steel = 7.85 kg/dm<sup>3</sup> the mass to be included later.



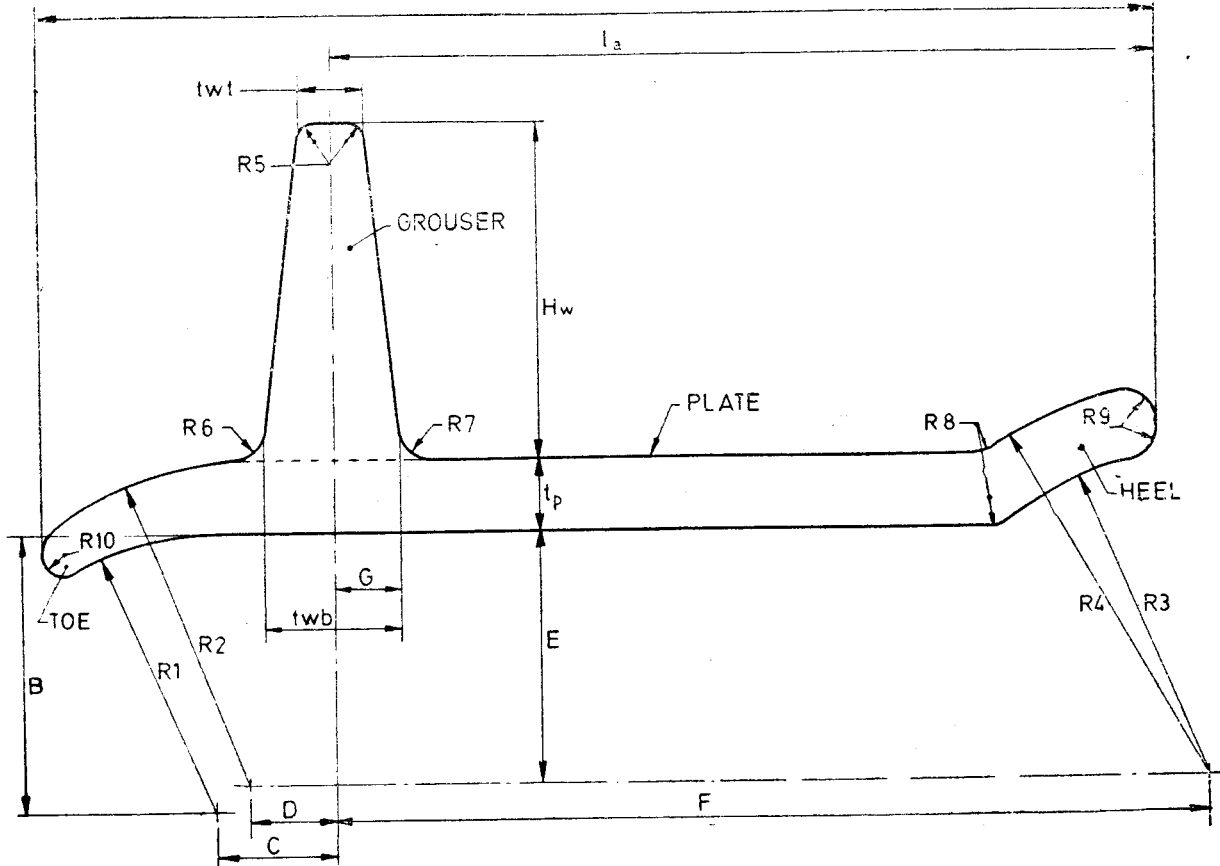


FIG. 1 TS-L1 SHOE SECTION

TABLE 1 DIMENSIONS AND DIMENSIONAL TOLERANCES

( Clauses 2.1, 4 and 4.1 )

SYMBOL	DIMENSION mm	TOLERANCE mm
<i>Lt</i>	264.5	$\pm 2.5$
<i>La</i>	195.0	+ 0 - 2.0
<i>twt</i>	15.0	$\pm 1.5$
<i>twb</i>	33.0	$\pm 1.0$
<i>tp</i>	17.0	$\pm 0.8$
<i>Hw</i>	79.0	+ 1.0 - 3.0
<i>C</i>	28.0	—
<i>D</i>	20.0	—
<i>E</i>	60.0	—
<i>F</i>	208.6	—
<i>G</i>	16.5	—
<i>R1</i>	66.0	—
<i>R2</i>	74.0	+ 0 - 1.5
<i>R3</i>	78.5	+ 1.5 - 0
<i>R4</i>	94.0	—
<i>R5</i>	4.0 <i>Max</i>	—
<i>R6</i>	8.0 <i>Max</i>	—
<i>R7</i>	8.0 <i>Max</i>	—
<i>R8</i>	6.0 <i>Max</i>	—
<i>R9</i>	7.5 <i>Max</i>	—
<i>R10</i>	5.0 <i>Max</i>	—

## 6. MATERIAL

**6.1** The steel for the manufacture of track shoe section TS-L1 shall be as agreed to between the purchaser and the supplier. However, typical requirements are given in Appendix A as a source of information.

## 7. ROLLING TOLERANCES

**7.0** Rolling tolerances measured in a manner shown in Fig. 2 shall be as specified in 7.1 to 7.3.

**7.1 Camber** — The permissible limit for camber shall be 3 mm in a length of 3 m.

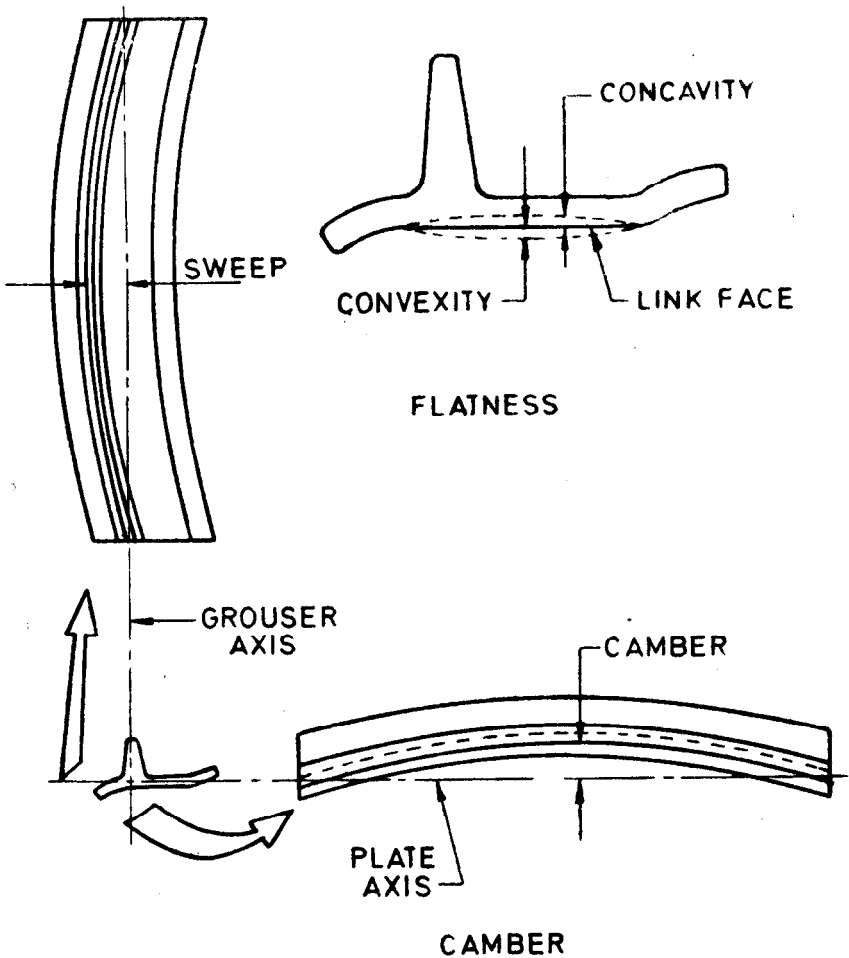


FIG. 2 METHOD OF MEASURING CAMBER, SWEEP AND CONCAVITY/CONVEXITY

**7.2 Sweep** — The permissible limit for sweep shall be 6 mm in a length of 3 m.

**7.3 Flatness** — The flatness at any straight edge line on the link face of the section shall be within the following limits:

Convexity	Not permitted
Concavity	0.5 mm <i>Max</i>

**7.4 Mass** — Tolerances on mass/m length shall be  $\pm 2.5$  percent.

## **8. LENGTH**

**8.1** Length of shoe sections shall be as agreed to between the purchaser and the supplier.

**8.2** Cutting tolerance on length shall be as agreed to between the purchaser and the supplier.

## **9. SURFACE QUALITY**

**9.0 General** — The provisions on surface quality given in **9.1** are to be used as an exception and not as a rule. The purchaser and supplier shall agree on the number of defects permissible on a length of shoe which shall also be mutually agreed. An over-riding requirement is that surface defects should not in any way be detrimental to the final requirements after heat treatment of the component.

**9.1 Laps and Seams** — No laps or seams shall be permitted in the Grouser Fillet (Radii *R6* and *R7*). Maximum depth of laps or seams on the grouser sides, plate and on the toe and heel edges shall be 1 mm.

**9.2 Guide Marks** — No guide marks shall be permitted in the Grouser Fillet (Radii *R6* and *R7*). In the other locations the maximum depth of guide marks shall be 1 mm below the normal surface.

**9.3** Material defects, such as piping and laminations are not permitted. In general hair line cracks are not permitted; however, hair line cracks up to 1 mm depth may be removed by grinding by the supplier.

**9.4** Material defects, such as piping and laminations are not permitted. Hair line cracks will not be permitted in Grouser Fillet (Radii *R6* and *R7*); however, hair line cracks in other areas up to 1 mm depth may be removed by grinding by the supplier.

Surface defects, such as, linear scars, insertions, roll scars, surface roughness, scale scars, jaw scars due to rolling, causing notches, are not permitted in Grouser Fillet (Radii *R6* and *R7*) and in other areas permitted up to 1 mm depth without grinding.

## APPENDIX A

### ( Clauses 0.3 and 6.1 )

### RECOMMENDED MATERIAL FOR HOT ROLLED TRACK SHOE SECTION TS-L1

#### A-1. GENERAL

**A-1.1** This Appendix covers the requirements for the steel for the track shoe section TS-L1 to be supplied in hot rolled condition.

#### A-2. CHEMICAL COMPOSITION

**A-2.1** The ladle analysis of the steel shall be as follows:

<i>Constituent</i>	<i>Percent</i>
Carbon	0.28-0.34
Manganese	0.80-1.30
Silicon	0.15-0.35
Boron	0.000 5-0.003
Phosphorus	0.04 <i>Max</i>
Sulphur	0.05 <i>Max</i>
<i>Residual Element</i>	
Chromium	0.20 <i>Max</i>
Nickel	0.25 <i>Max</i>
Molybdenum	0.10 <i>Max</i>

NOTE — The boron factor should be 1.8-2.2.

**A-2.2 Product Analysis** — The product analysis shall be carried out on the finished product. Permissible variation in case of such product analysis from the limits specified in 2.1 shall be as follows:

<i>Constituent</i>	<i>Variation Percent</i>
Carbon	$\pm 0.02$
Manganese	$\pm 0.05$
Silicon	$\pm 0.03$
Phosphorus	$\pm 0.005$
Sulphur	$\pm 0.005$

### A-3. SUPPLY CONDITIONS

**A-3.1** Steel shall be supplied in fully killed condition.

**A-3.2 Grain Size** — The grain size or index number as determined by the method given in IS : 2853-1964\* shall be between 5 and 8.

**A-3.3 Inclusion Rating** — The steel shall be free from non-metallic inclusions and if present it shall not exceed the inclusion ratings of 3A, 3B, 2.5 C and 2.5 D thin series ( see IS : 4163-1967† ).

**A-3.4 Decarburization** — Maximum affected depth of decarburization shall be 0.75 mm per surface. Carbon free depth shall not be permitted.

**A-3.5 Hardenability** — The hardenability of steel determined in accordance with IS : 3848-1966‡ shall conform to the following:

Depth mm	Hardness HRC
1.5	48-55
5.0	45-52
7.0	40-48

### A-4. MECHANICAL PROPERTIES

**A-4.1** The steel shall have the following typical mechanical properties:

Tensile strength	10.2 MPa ( 100 kgf/mm <sup>2</sup> ), <i>Min</i>
Elongation	14 percent, <i>Min</i>
Impact value	29 J ( 3.0 kgf. m/cm <sup>2</sup> ), <i>Min</i>

NOTE—These properties should normally be achievable when hot rolled sections are austenitized, water quenched and furnace tempered at 400°C for 2 hours.

**A-4.1.1** The specimen for conducting these tests should be taken from locations indicated in Fig. 3.

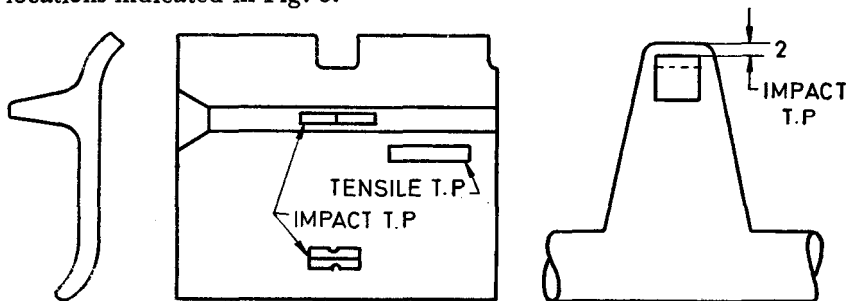


FIG. 3 LOCATION OF TEST SPECIMEN

\*Method of determining austenitic grain size of steel.

†Method for determination of inclusion content in steel by microscopic method.

‡Method for end quench test for hardenability of steel.